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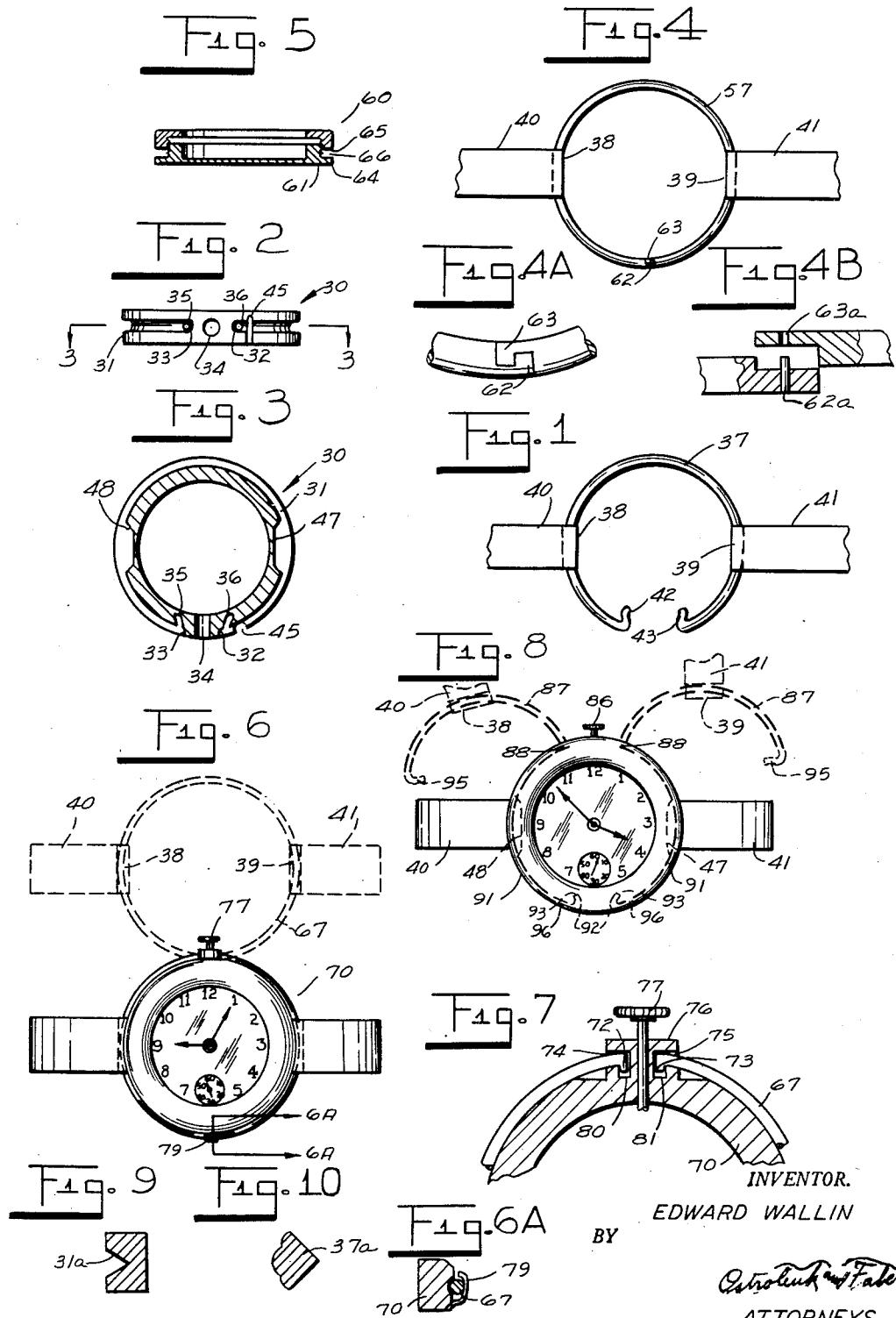
E. WALLIN

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WATCH BAND ATTACHMENT

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WATCH BAND ATTACHMENT

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Fig. 11

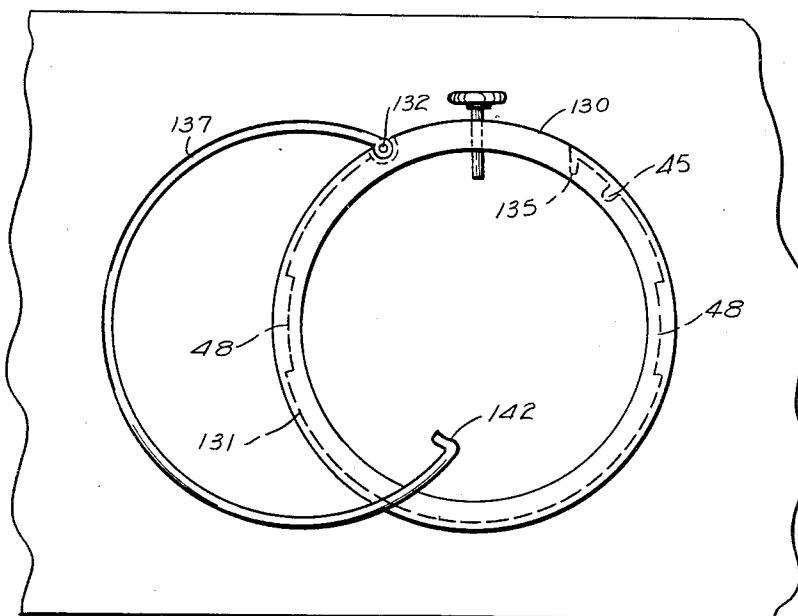
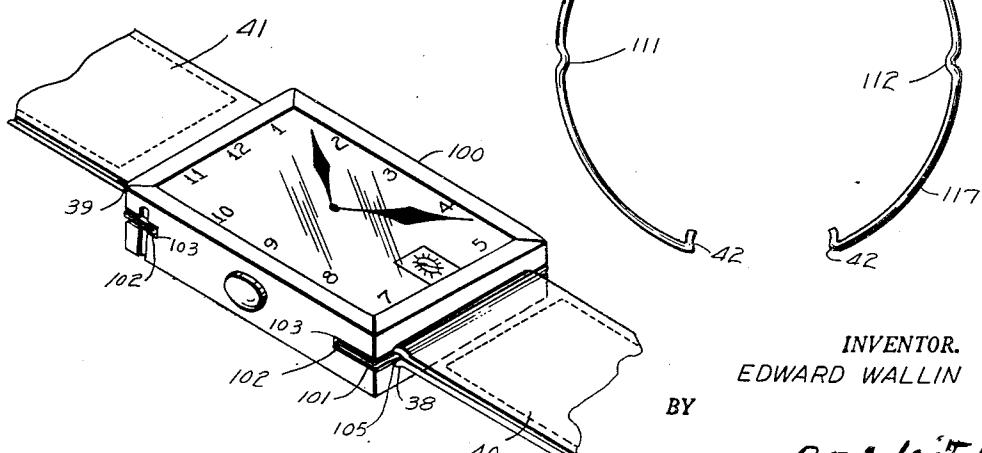


Fig. 13

Fig. 12



INVENTOR.
EDWARD WALLIN

BY

Ostroboth & Fisher
ATTORNEYS

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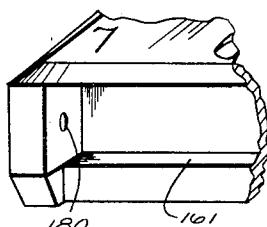
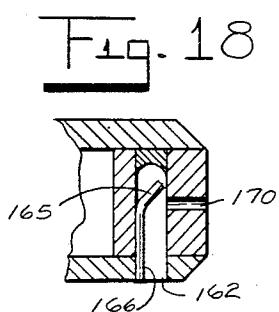
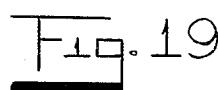
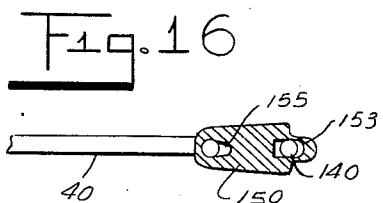
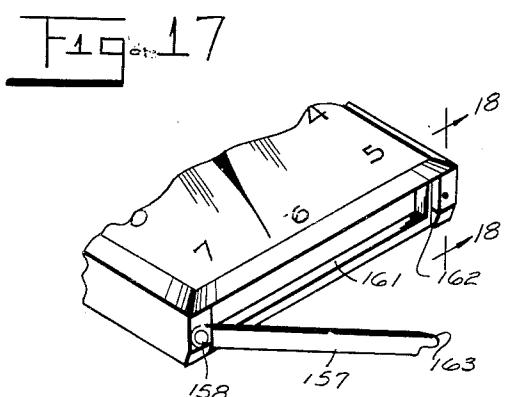
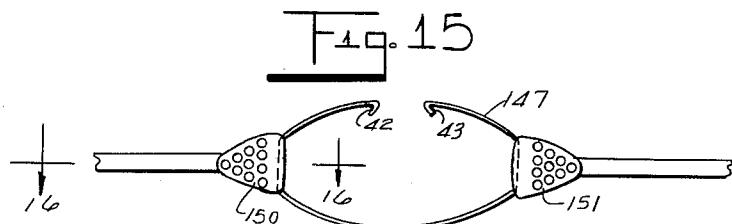
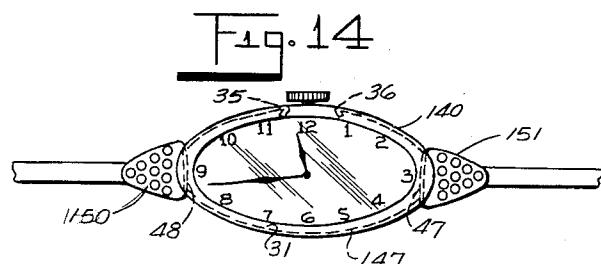
E. WALLIN

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WATCH BAND ATTACHMENT

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3 Sheets-Sheet 3



BY

INVENTOR.
EDWARD WALLIN

Attoluck & Feltie
ATTORNEYS

UNITED STATES PATENT OFFICE

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WATCH BAND ATTACHMENT

Edward Wallin, Los Angeles, Calif.

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5 Claims. (Cl. 58—88)

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My present invention relates to watch bands and more particularly to means for securing the straps or bands to wrist watches in such a manner that the straps or bands may readily be removed and replaced while, at the same time, the strap or band is securely engaged with the wrist watch during use. It is intended also to improve the appearance of the watch by eliminating the four lugs which support the spring pins on which the band is held on many present watch cases.

In the usual wrist watch construction, the watch case is provided with a pair of extending lugs on each side having aligned openings to receive the ends of a spring pin, the loop of a watch band passing around the spring pin. A separate spring pin is required on each side and the pin itself, although it is necessarily very small, is a rather complex structure consisting of a sleeve with an internal spring driving out a narrow wire or rod at each end into engagement with the openings in the lugs. In order to remove and replace the wrist watch straps or bands, it is necessary to drive a pin through the opening of the lug to depress or push in the wire or rod of the spring pin. This is usually a delicate task for all but watchmakers.

In women's wrist watches, which are much smaller, the watch case is usually provided with an integral loop at each side and the watch band consists either of a cord drawn through the loop, the ends of the cord being secured together by a fastening means which is clinched on, or the watch band is provided with a flexible malleable end piece which is passed either through the loop or through a ring held in the loop and then bent over. Both of these forms of strap or band attachment for the watch are also difficult to remove and replace.

My invention contemplates a simplified attachment for the band or strap of a watch wherein the attaching means consists of a steel spring or other wire, suitably plated, engaging the surface of the watch case which is readily removable so that the loop of the strap or band may be passed thereover, then replacing this wire on the watch case which will cause the strap or band to be fastened securely against the case.

Thus a primary object of my invention is the provision of novel securing means for the strap or band of a watch to the watch case.

Another object of my invention is the provision of a wire-like member mounted on the watch case for holding the loop of the strap or band.

Still another object of my invention is the arrangement of a watch case so that it has an

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annular groove in the case within which groove a wire may be positioned and locked, the said wire being passed through the loop of the strap or band of the watch.

5 The foregoing and many other objects of my invention will become apparent in the following description and drawings in which:

Figure 1 is a view of one form of my novel loop for securing the straps or bands of a wrist watch

10 to the watch casing.

Figure 2 is an end view of a watch casing adapted to cooperate with the elements of Figure 1.

15 Figure 3 is a cross-sectional view taken on line 3—3 of Figure 2 looking in the direction of the arrows.

Figure 4 is a view of a modified form of wire loop.

20 Figure 4A is a detail of the means for interengaging the ends of the wire loop of Figure 4.

Figure 4B is a detail of a modified form of the means for interengaging the ends of the wire loop of Figure 4.

25 Figure 5 is a cross-sectional view of a watch casing adapted to cooperate with the wrist watch supporting elements of Figures 4 and 4A.

Figure 6 is a plan view of a wrist watch with a modified form of wire loop.

30 Figure 6A is a cross-sectional view taken on line 6a—6a of Figure 6.

Figure 7 is an enlarged cross-sectional view showing the manner of securing of the wire loop of Figure 6 to the watch.

35 Figure 8 is a plan view showing another modified form of wire loop supporting element for the wrist watch strap.

40 Figures 9 and 10 are cross-sectional views respectively showing an arrangement of the annular groove of the watch case and a cooperating arrangement of the wire loop to achieve a decorative effect.

Figure 11 is a view showing another modified form of my novel wrist watch supporting member.

45 Figure 12 is a view in perspective showing the application of my novel wrist watch supporting units to a rectangular shaped watch.

Figure 13 is a view showing a modification of the wire loop of Figure 1.

50 Figure 14 is a plan view showing the adaptation of my invention to a jeweled wrist watch wherein the jeweled element may readily be removed and replaced.

Figure 15 is a view showing the wire loop

55 which cooperates with the watch of Figure 14.

Figure 16 is a cross-sectional view taken on line 16—16 of Figure 15.

Figure 17 is a view in perspective showing a modified form of wire support for the wrist watch band or strap, the same being a modification of the construction of Figure 8.

Figure 18 is a cross-sectional view taken on line 18—18 of Figure 17.

Figure 19 is a fragmentary view in perspective showing a modified form of the left hand portion of Figure 17.

Referring now to Figures 1, 2 and 3, my novel watch casing 30 is provided with a circumferential and/or annular groove 31 in the perimeter thereof. As may be readily seen in Figures 2 and 3, the groove 31 extends substantially around the entire watch casing terminating at 32, 33 adjacent the opening 34 in the watch casing which receives the winding stem of the watch. The groove 31 is provided adjacent its ends 31, 32 with lock-in openings 35, 36 drilled into the watch casing 30 from the base of the groove.

The said openings 35, 36 may be made in any shape to conform to the shape of the spring, the ends of which they are intended to hold. It is preferred, however, that these ends be round regardless of the shape of the spring. The openings 35, 36 should be inclined several degrees to form divergent acute angles at the section tangent the bent ends to hold the ends of the springs.

A wire loop 37 is provided over which the loops 38, 39 of the watch band or strap elements 40, 41 may be passed. The wire loop 37 is so arranged that it may readily be snapped into the grooves 31 of the watch casing. The ends of the wire loop 37 are provided with re-entrant bends 42, 43 registering respectively with the openings 35, 36 of the watch casing which communicate with the groove 31.

When the wire loop 37 is snapped into the groove 31, the re-entrant bends 42, 43 thereof are snapped into the openings 35, 36 and held frictionally therein.

The angle of the re-entrant bends 42, 43 and of the openings 35, 36 are so arranged that a lateral pull in opposite directions on the straps 40 and 41 will not result in pulling the bent portions 42, 43 of the loop 37 out of the openings 35, 36 but rather will tend to lock them more firmly in place.

The watch casing 30 is provided with the vertical groove 45 adjacent the end 32 of the groove 31 and the opening 36 thereof. This groove 45 makes it possible to insert a pin beneath the wire loop 37 adjacent the bent back portion 43 to snap this portion 43 thereof out of the opening 36 so that the wire loop 37 may readily be removed.

The groove 31 is also provided with diametrically opposite recesses 47, 48 in the watch casing 30 to provide room for the loops 38, 39 of the band or strap elements 40, 41. These should follow the contour of the watch as this will allow the strap to fit closely to the watch case although the recesses may also be straight as shown in Figure 3. This will also prevent the retaining wire loop from being forced away from the case. The sides of the recesses 47, 48 may also be sloped as shown to accommodate different widths of watch bands or straps.

In operation, the loops 38, 39 of the strap or band elements 40, 41 are slipped over the wire loop 37 to the position shown in Figure 1. The wire loop 37 is snapped into the groove 31 with

re-entrant portion 42 thereof in opening 35, the loops 38, 39 are positioned so as to register with the recesses 47, 48 and the re-entrant portion 43 of the wire loop 37 is snapped into the opening 36. The wire 37 is thus firmly held within the groove 31 and the straps 40, 41 are securely attached to the watch. The loop 37 may be removed as above described and the straps 40, 41 readily replaced thereon and then the wire loop 37 may again be reattached to the watch.

No special tools are required other than a pin to snap the re-entrant portion 43 of loop 37 out of opening 36. No delicate spring pins or malleable bendable members are required and the change may be made by the unskilled user.

While the loop 37 has thus far been shown and described as a wire loop, it may have any suitable cross-sectional arrangement provided it is sufficiently flexible and resilient to be snapped into the groove 31 as above described. Thus the groove 31 may have a rectangular cross-section and the wire 37 may have a similar cross-section; or the groove and wire may have matching over, circular or other cross-sections, with the wire either flush with the side of the case or protruding therefrom; or, as shown in Figures 9 and 10, the groove 31a shown in Figure 9 may be triangular in cross-section and the wire loop 37a may also be triangular in cross-section and have appropriate horizontal peripheral curves; the ends of the loop 37a may then be tapered down where required to cooperate with recesses 47, 48 and with openings 35, 36.

Thus my wrist watch band or strap attachment means, in addition to being secure and extremely simple to operate, may be as ornamental in appearance and construction as the construction and use of the watch may require.

In Figures 4 and 5, I have shown a modification of the construction of Figures 1 to 3 in which the wire loop 57 is provided, as shown in Figure 4A, with interlocking ends 62 and 63. The straps or bands 40 and 41 are arranged so that the wire 57 passes through the loops 38 and 39 thereof. The ends 62 and 63 are manually interlocked, thus providing a substantially continuous ring holding the strap or band elements 40 and 41.

The watch case 60 is so arranged that either its back or front cover 61 will be screwed into the remainder of the case, the said cover 61 having a flange 64 which in cooperation with the flat portion 65 of the watch case forms the groove 66. The threads of the cover member 61 may be appropriately cut into or recessed at diametrically opposite points to provide clearance for the loops 38 and 39 without interfering with the rotation of cover 61 into the case 60.

The interlocked wire loop 57 of Figure 5 is laid on the flange 64 just prior to the insertion of cover member 61 into the case 60 and is held in the groove 66 thus formed, the cover member 61 being tightened so that flange 64 and wall 65 press down on the wire loop 57. The interlocked ends 62 and 63 are so arranged that they cannot be pulled apart by a pull in the plane of the wire loop 57 although they may readily be separated by moving one of the ends with respect to the other in a plane normal to that of the wire loop 57.

The placement of the wire loop 57 in the groove 66 when the cover member 61 is secured to the watch cover thus prevents the ends 62 and 63 from being pulled apart.

A small recess may be placed in the outer

threaded wall of the cover 61 and a corresponding recess in the inner threaded wall of the case 60; a flat leaf spring may be secured at one end in one of the recesses, the leaf spring having a hump extending beyond its recess; the hump of the leaf spring will snap into the recess of the other member when the cover is screwed down to closed position and will thus provide a resilient lock for the cover.

In order to replace the watch band or strap 40 and 41, it is only necessary to remove the cover member 61 from the case 60, separate the ends 62 and 63 of the wire loop 57 and replace the watch band or strap; then the ends 62 and 63 of the wire loop 57 are interlocked once more and mounted in the watch case of Figure 5 as above described. The bottom section 61 may also be made to snap into place and hold the wire loop 57 against wall 55.

In Figure 4B I have shown a slightly modified form for interlocking the ends of the wire loop 57. One end is notched and provided with pin 62a; the other end is notched and provided with opening 63a to receive pin 62a. The elements may then lock together to make the loop apparently flush and continuous at the joint.

In Figures 6 and 7 I have shown another modified form which may eliminate the milled groove around the case or which may cooperate with a shallow milled groove wherein the wire loop 67 is mounted on the watch case 70 by means of re-entrant elements 72 and 73 on the wire loop, which hook into recessed openings 74 and 75 on that portion 76 of the watch case 70 which carried the stem 77 of the watch. In this case the wire loop 67 has substantially the construction of the wire loop shown in Figure 1 but the re-entrant ends 72 and 73 are rotatably held in the recessed openings 74 and 75.

The principal opening of openings 74 and 75 are sufficiently wide to admit the re-entrant ends 72 and 73 of the loop 67. The inner portion of each of the openings 74 and 75 is provided with a recess 80, 81 into which the re-entrant portions 72 and 73 of the wire loop 67 swing when the wire loop is moved from the dotted line position of Figure 6 to the solid line position of Figures 6 and 7. That is, with the wire loop 67 in the dotted line position of Figure 6, the re-entrant portions 72, 73 of the wire loop 67 do not engage the recesses 80, 81 and the free ends of the wire loop 67 may be withdrawn from openings 74, 75 so that the watch band or strap elements 40, 41 may be replaced. When the watch band elements 40, 41 have been replaced on loop 67, the ends 72, 73 are inserted in openings 74, 75 in the dotted line position of Figure 6 and the loop 67 is then rotated down to the solid line position of Figures 6 and 7.

On this rotation, the re-entrant ends 72, 73 of wire loop 67 turn into the recesses 80, 81 thus locking the ends of the loop 67 in openings 74, 75 and preventing removal therefrom.

The wire loop 67 may be arranged to snap down around the outside of the watch as shown in Figure 6 or to snap into a recess in the face or back of the watch. Any suitable simple securing means may be used to hold the wire loop 67 down. Thus, as shown in Figures 6 and 6A, a simple spring lock 79 secured to the watch case 70 at the side opposite the stem 77 will serve to retain the wire loop 67. It will also be obvious that if the opening of the spring lock is toward the back of the case, the loop cannot swing out while the watch is being worn.

It will be obvious that any appropriate conformation or dimensioning of the recess into which the loop 67 snaps may also be sufficient to retain the wire loop 67 in position. This recess may also be provided with additional recesses to provide clearance for the loops 38, 39 of the watch band or strap elements 40, 41.

For this purpose, the recess above referred to need not merely be peripheral but may be a circular recess cut or otherwise formed in the back of the casing with appropriate slots or appropriate milled areas communicating from the recess to the edge of the casing.

In Figure 8 I have shown another modified form in which the wire loop elements 87, 87 are hinged connected at 88, 88 on opposite sides of the stem 86 to the watch casing. Or a single hinge for both wires 87, 87 may be provided opposite the crown of the watch with the recesses 92 adjacent the crown of the watch.

A groove 91, 91 is formed on each side of the watch casing terminating at 92, 92 in the openings 93, 93. Each of the wire members 87 is arranged so that it will lie in the groove 91 and so that when placed in the groove 91 the re-entrant ends 95, 95 will enter the openings 93, 93.

The hinge securing 88 need merely be a small screw, rivet or stud passing through registering openings in the watch case on either side of the groove 91 and through an appropriate opening in the wire member 87.

In the case of Figure 8, the wire members 87 are made a permanent part of the watch case and cannot be lost. Appropriate vertical grooves 96, 96 may be provided to permit the user to snap the wire member 87 out of openings 93 and grooves 91.

When the wire members 87 have been snapped out of the grooves 91, the strap elements 40, 41 may be replaced by sliding the loops 38, 39 on the wires 87. The wires 87 are then snapped back into the grooves 91 with the re-entrant elements 95 entering the openings 92 and the band or strap loops 38, 39 registering with the recesses 47, 48.

In Figure 11 I have shown another slightly modified form of the construction of Figure 8 wherein instead of having the two wire elements 87 of Figure 8, a single wire member 137 is used in conjunction with groove 131. Groove 131 in the watch case 130 has exactly the construction shown in connection with groove 31 of Figure 3 including the recesses 47 and 48 for the watch band or strap loops and the vertical snap out groove 45.

While loop 137 is provided with the re-entrant end 142 which snaps into the opening 135, the opposite end of wire loop 137 is hinged at hinge pin 132 which passes through appropriate registering openings on opposite sides of the groove 131 and an opening in the end of wire loop 137.

The construction of Figure 11 thus combines all of the advantages of the single wire loop of Figures 1, 2 and 3 with the hinged arrangement of the wire members of Figure 8. The operation of wire loop 137 will be obvious from the previous descriptions.

In Figure 12 I have shown in perspective a watch case 100 of rectangular form having a peripheral wire 101 with re-entrant ends 102 engaging in opening 103. The wire 101 holds the loops 38, 39 of straps 40 and 41. The ends of the watch case 100 are provided with recesses 105 in which the loops 38, 39 may register. The wire 101 is of course contained in a groove to be flush with the surface of the case.

Here again as in all of the constructions hereinbefore described, the wire loop and the groove with which it cooperates may have any appropriate horizontal cross-section to enhance the appearance of the watch.

In Figure 13 I have shown a wire loop 117 which is a slightly modified form of the wire loop 37 of Figure 1. The wire loop here is provided with the re-entrant members 42, 43 of the Figure 1 construction but is also provided with diametrically opposite registering elements 111 and 112 which may, as shown, simply be bends in the wire or which may be lugs or other elements affixed thereto.

The loops 38, 39 of the strap or band elements 40, 41 may then be provided with appropriate central openings engaged by the registering elements 111 and 112 which will thereby always center the loops 38 and 39 of the band or strap elements 40, 41 and maintain them in the desired registering relation; such registering elements 111 and 112 may, as will be obvious, be used in connection with each of the constructions herein described. This permits the use of bands narrower than the full width of recesses 47 and 48 and causes them to always be centered and held firmly.

In Figures 14, 15 and 16, I have shown the manner in which my novel wrist band attachment may be used in connection with jeweled watches to replace or rearrange the jewels thereon. In ladies' jeweled watches, wherein precious stones are used to enhance the appearance of the watch, these stones are usually set at the wrist band attachment. By means of my invention these jeweled members may readily be secured to and removed from the watch and be replaced for daytime or less formal wear by a plain band. Thus in Figure 14 I have shown an oval ladies' watch case 140 provided with a wire loop 147 which corresponds with the wire loop 37 of Figure 1 except that it is oval to follow the shape of the watch case.

The watch case 140 and the wire loop 147 have the groove and loop construction described in Figures 1, 2 and 3 and the wire loop is placed into the groove and removed therefrom in the manner already described in Figures 1, 2 and 3.

As shown in Figures 15 and 16, the ornamental elements 150, 151 of the watch are provided with loops 153 which will slide on the wire loop 147. These jeweled elements 150 are also provided with additional means to secure them to the watch band 40; as shown, these means of securing may be an additional opening or loop 155 in the jeweled member 150 through which the watch band 40 passes.

The loop members 153 of the jeweled members 150, 151 are dimensioned so as to register properly with the recesses 48 and 47 in the groove 31.

When the user of the watch desires to wear the watch as a plain wrist watch, then she merely removes the wire loop 147 in the manner previously described in connection with Figures 1, 2 and 3, removes the jeweled elements 150 and 151 and places a plain band similar to that shown in Figures 1 to 4 on the loop 147. The user then replaces the loop 147 as already described to complete the attachment of the new band.

By this means, therefore, the user of the watch is provided with a simplified device which facilitates the attachment and removal of ornamental and precious elements to the wrist watch.

The loop 147, or any of the other removable loops above described, may themselves in addition to having an ornamental cross-section be

provided with appropriate gems or other decorations to enhance the value and appearance of the watch. To avoid weakening the loop by making the holes or depressions necessary to hold the gems, the loop may be widened or thickened at the gem mountings.

The watch may then be constructed so that the case is a plain gold or platinum which may be used in connection with a plain wrist band or strap; but when it is desired to turn the watch into a formal jeweled watch, a gem studded loop and/or gem studded elements 150, 151 may be readily mounted thereon.

This means for varying the appearance of the watch from time to time may of course be used with any of the constructions herein described.

In Figure 17 I have shown a slightly modified form of the construction of Figure 8 wherein the wrist band attaching member comprises a wire or band 157 hinged at 158 so that it may rotate into and out of the recess 161 in a plane which is generally normal to the plane of the watch. The opposite end of the recess 161 is provided with a slot 162 up into which the end 163 of the wire or band 157 may be pushed. The slot 162 as shown in Figure 18 is provided with a latch member 165 which is part of leaf spring 166 which biases the latch 165 to block the slot 162. The latch member 165 is so arranged that extension 163 of the wire or band 157 may push past its surface to be captured above its top surface and thus be securely retained against removal.

A watch band loop mounted over the wire or band 157 will thus be securely held in the recess 161 against actual removal.

The latch member 165 may be pushed in to permit the removal of wire or band end 163 by a pin which enters the hole 170 to push the latch 165 back.

The pin in hole 170 pushes the latch 165 back sufficiently so that the end 163 may move in front of the latch 165 and against the pin. The pin is then withdrawn while downward pressure is maintained on the wire or band 157 and the end 163 may then slide out of the notch 162. The wire or band 157 may thus be readily closed and opened to change the wrist band or strap or to attach jeweled elements thereof.

It will be obvious that in addition to arranging the wire or band 157 so that it is hinged to rotate in a direction normal to the plane of the watch, it may also be hinged to rotate in a direction parallel to the watch. In this case the slot 162 will also extend parallel to the plane of the watch to receive the end 162 of the wire or band 157 but otherwise the construction will be the same.

In Figure 19 I have shown in fragmentary form a modification of the left side of the recess 161 wherein, instead of hinging the band 157 on a hinge pin 158, a simple opening 180 is provided for the left end of wire or band 157, so the wire or band 157 may actually consist of a simple removable rod. The left side of the wire or band 157 is pushed into the opening 180. The watch band or strap loop is passed thereover and the other end 163 of the wire or band 157 is snapped into either a horizontal or vertical slot 162 as previously described.

It will thus be seen that in the various constructions above described, I have set forth a simplified means for removably attaching a strap or band to a wrist watch, the attachment being so arranged that it is extremely simple to use, does not require any delicate elements and is therefore

easy to manufacture, lends itself to appropriate ornamentation and obviates the necessity for complex extensions, lugs or other elements on the watch case itself.

The watch case may be attached to an ornamental pin by a single band or strap engaging one side of the wire loop in any of the constructions above described; or it may be attached to a watch fob in the same manner; or the loop may carry a ring or be bent to form a ring which may be attached to a chain, pin, strap, band or fob.

Also, a strap may be attached at its center to one side of the loop to provide a watch of novel design; the strap may have a central recess or curve to follow the watch case with a fold or hem to receive the loop.

In each of the constructions herein described, a simple wire loop or band having an appropriate cross-section either from a mechanical or decorative point of view is utilized to removably secure the wrist band or strap to the watch.

In the foregoing I have described my invention solely in connection with preferred illustrative embodiments thereof. Since many variations and modifications of my invention will now become obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained, but only by the appended claims.

I claim:

1. Securing means for attaching a watch band to a watch case; said means comprising a groove in the periphery of the watch case; said groove extending over more than 180°; a spring loop member having re-entrant end pieces; recesses at the ends of said groove for receiving the re-entrant end pieces of said spring loop member; a loop on said watch band; said watch band loop being mounted over said spring loop.

2. Securing means for attaching a watch band to a watch case; said means comprising a groove in the periphery of the watch case; said groove extending over more than 180°; a spring loop member having re-entrant end pieces; recesses at the ends of said groove for receiving the re-entrant end pieces of said spring loop member; said recesses and said re-entrant end pieces being inclined at divergent acute angles to their respective points of tangency to the loop; a loop on said watch band; said watch band loop being mounted over said spring loop.

3. Securing means for attaching a watch band to a watch case; said means comprising a groove in the periphery of the watch case; said groove extending over more than 180°; a spring loop

member having re-entrant end pieces; recesses at the ends of said groove for receiving the re-entrant end pieces of said spring loop member; said recesses and said re-entrant end pieces being inclined at divergent acute angles to their respective points of tangency to the loop; a loop on said watch band; said watch band loop being mounted over said spring loop, and an additional recess in said watch case communicating with said groove adjacent to one of said first mentioned recesses and substantially normal thereto to facilitate removal of the spring loop member.

4. Securing means for attaching a watch band to a watch case; said means comprising a groove in the periphery of the watch case; a spring loop member mounted in said groove; a loop on said watch band; said watch band loop being mounted over said spring loop; a recess in said groove substantially equal in dimension to the dimension of the watch band loop to receive and position the watch band loop.

5. Securing means for attaching a watch band to a watch case; said means comprising a groove in the periphery of the watch case; a loop member releasably secured in said groove; a loop on said watch band; said watch band loop being mounted over said loop member; a recess in said groove substantially equal in dimension to the dimension of the watch band loop to receive and position the watch band loop.

30 EDWARD WALLIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
410,370	Moeckel	Sept. 3, 1889
40 1,204,902	Pollock	Nov. 14, 1916
1,257,159	Wachter	Feb. 19, 1918
1,614,864	Beskow	Jan. 18, 1927
1,702,895	Dinhofer	Feb. 19, 1929
1,790,706	Hill	Feb. 3, 1931
45 1,927,838	Kislenger	Sept. 26, 1933
2,123,688	Whitehead	July 12, 1938

FOREIGN PATENTS

Number	Country	Date
50 121,145	Switzerland	June 16, 1927
163,059	Switzerland	Nov. 16, 1933
197,915	Switzerland	Aug. 16, 1938
207,750	Switzerland	Mar. 1, 1940
691,623	France	July 15, 1930